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(54) **Title:** TRACKING ACTIVITIES OF EVENTS

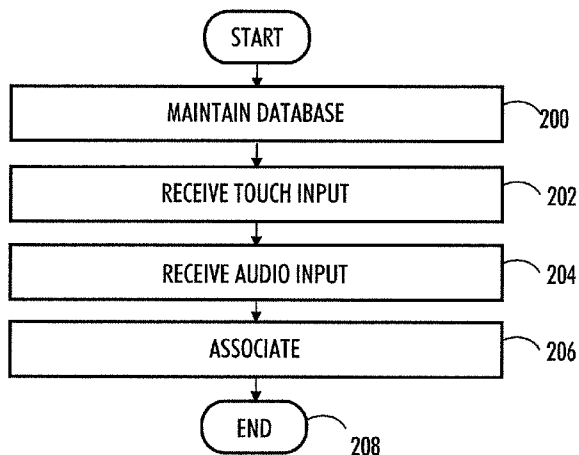


FIG. 2

(57) **Abstract:** The present invention relates to an apparatus and a method for tracking activities. In the solution, a database of names is maintained (200) and a touch screen is controlled to receive (202) a touch input. Microphone is controlled (204) to receive audio input and the touch input is associated (206) with a given name in the database on the basis of the audio input.

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## TRACKING ACTIVITIES OF EVENTS

### Field of the invention

The invention relates to tracking activities of events on playing field, and more particularly to tracking in real time activities of soccer, football, ice  
5 hockey or other team event typically played on a playing field.

### Background

It is common to gather different kinds of statistics related to sporting events such as soccer, football, ice hockey or other team event typically played on a playing field. The statistics may relate to the time the ball or puck of the  
10 game is in possession of each team and the shots and passes made during the game. Typically these statistics have been gathered manually by watching the game and keeping a manual score of the events. The manual gathering may have been done in real time or later on the basis of a recorded video capture of the game.

15 Recently some computer aided solutions for keeping track of game events have been introduced. The solutions enable gathering some general data of game events. However, the prior art solutions gather data only on team level. Data related to individual team members is not available.

### Brief description

20 An object of the present invention is to provide a method and an apparatus for tracking activities of events on playing field in such a manner that data related to both individual players and the team as a whole may be recorded.

25 According to an aspect of the present invention, there is provided a method for tracking activities, comprising: maintaining a database of names; controlling a touch screen to receive a touch input; controlling a microphone to receive audio input; and associating the touch input with a given name in the database on the basis of the audio input.

30 According to an aspect of the present invention, there is provided an apparatus, comprising: at least one processor; and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus at least to perform: maintain a database of names; control a touch screen to receive a touch input; control a microphone to receive audio input;

associate the touch input with a given name in the database on the basis of the audio input.

One or more examples of implementations are set forth in more detail in the accompanying drawings and the description below. Other features  
5 will be apparent from the description and drawings, and from the claims.

### List of the drawings

In the following the invention will be described in greater detail by  
10 means of preferred embodiments with reference to the accompanying drawings, in which

Figure 1 illustrates an example of an apparatus where embodiments of the invention may be applied;

15 Figures 2 and 3 are flowcharts illustrating some embodiments of the invention;

Figure 4 illustrates an example of user interface;

Figure 5 illustrates an example of an embodiment utilising a simple method to identify between attack and defence areas;

20 Figure 6 illustrates an example of an embodiment of collecting information about how players of a team move in playing field during game event; and

Figure 7 illustrates an example of a heat map.

### Description of some embodiments

Figure 1 illustrates a simplified example of an apparatus 100 where  
25 embodiments of the invention may be applied.

It should be understood that the apparatus is depicted herein as an example illustrating some embodiments. It is apparent to a person skilled in the art that the apparatus may also comprise other functions and/or structures and not all described functions and structures are required. Although the apparatus  
30 has been depicted as one entity, different modules and memory may be implemented in one or more physical or logical entities. The apparatus may also be a part of a larger apparatus.

The apparatus of the example includes a control circuitry 102  
configured to control at least part of the operation of the apparatus. The control  
35 circuitry 102 is configured to execute one or more applications.

The apparatus may comprise a memory 104 for storing data or applications. Furthermore the memory may store software 106 executable by the control circuitry 102. The memory may be integrated in the control circuitry.

5 The apparatus further comprises user interface 110 operationally connected to the control circuitry 102. The interface may comprise a touch sensitive screen 112, a microphone 114, and a keypad, for example. Commands controlling the apparatus may be given in many various ways as one skilled in the art is aware.

10 In an embodiment, the apparatus may comprise an input/output interface 108 operationally connected to the control circuitry 102. The input/output interface 108 enables connecting the apparatus to different networks and systems. The input/output interface 108 may comprise a transceiver able to communicate with cellular communication systems such as universal mobile telecommunications system (UMTS) radio access network (UTRAN or E-UTRAN), long term evolution (LTE®, known also as E-UTRA), long term evolution advanced (LTE-A®) or Global System for Mobile Communication (GSM), for example. The transceiver may also communicate with networks using Wireless Local Area Network (WLAN) based on IEEE 802.11 standard, for example. The input/output interface 108 may comprise an interface for wired communication with a computer.

20 The apparatus typically refers to a portable computing device. The apparatus may be wireless mobile communication device operating with or without a subscriber identification module (SIM), including, but not limited to, the following types of devices: a mobile station (mobile phone), smartphone, personal digital assistant (PDA), a touch screen computer or a tablet.

In an example embodiment, the applications stored in the memory 104 may cause the apparatus at least to execute steps illustrated in the flowchart of Figure 2.

30 In this example, the apparatus is utilised in tracking activities of an event on playing field. The activities may be related to a soccer game played on the field, for example. Typically the event is a team sport event where two teams comprising a set of players are playing. In soccer, for example, the activities happening on the playing field may be passes to given direction to a fellow team player, shots, missed passes, corner kicks, free kicks, movements with the ball and throws, to name a few.

35 The coaches of teams typically want to get as much information of

the game as possible. All statistical information related to the game and the players help the coach to develop the team and the players of the team further. The data may be utilised in planning tactics future games and exercises for the players.

5           The apparatus may be used by the coach when watching a game in real time played on a playing field. However, the apparatus may naturally be used when watching a video recording of a game.

          In step 200, the apparatus is configured to maintain a database of names. The database may be stored in the memory 104, for example. The  
10       names may be names of the players of a team.

          In step 202, the apparatus is configured to control a touch screen to receive a touch input. The touch screen is configured to receive touch input from the user of the apparatus. In an embodiment, the user may touch the screen and swipes to a given direction when a player of the team performs an  
15       action on the playing field.

          In step 204, the apparatus is configured to control a microphone to receive audio input. The microphone is configured to receive audio input from the user of the apparatus. In an embodiment, the user says the name of the player performing the action.

20           In step 206, the apparatus is configured to associate the touch input with a given name in the database on the basis of the audio input. In an embodiment, the apparatus stores information on the touch input and associates the touch input with a name from the database on the basis of the audio input. The apparatus may apply voice recognition algorithms to detect  
25       the name which was spoken by the user and find a corresponding name from the database.

          The example ends at step 208.

          Thus apparatus running an application enabling the steps described above enable a user to track the activities of events on playing field. Different  
30       activities may be associated with different touch properties.

          Figure 3 illustrates another example of an embodiment, which may be performed by the apparatus. Not all steps are necessarily performed at each time and the steps may be performed in different order. Reference is made to Figure 4 which illustrates an example embodiment of the user  
35       interface.

          In an embodiment, the aim is to collect information about the

activities in a way that the time for user to look at the user interface is minimized, i.e., the user can focus on following the game as much as possible. This is made possible with the simple user interface of Figure 4. The apparatus of the embodiment may be held with two hands and the user may interact with the device with the use of thumbs 400, 402, for example.

During a match typically the only time to look at the user interface is when the ball is not in the game (e.g. outside of pitch or a referee has stopped the game).

In an embodiment, apparatus may be configured to control the touch screen to display a first area 404 and a second area 406. The first area 404 is reserved for the actions of the team monitored. The apparatus may be configured to activate microphone after detecting a touch on the first area of the touch screen. The second area 406 may be reserved for the opposing team. The second area is touched when the opposing team gains the control of the ball or puck. Actions of the opposing team are not necessarily monitored and stored.

In step 300, the apparatus may be configured to receive a selection of a team. The apparatus may be configured to store more than one database of names. The databases may be stored in the memory 104, for example. The names may be names of the players of teams.

In step 302, the apparatus is configured to select and load a database on the basis of the team selection

In an embodiment, the apparatus is configured to show the names 408 of the players of the team on the touch screen as illustrated in the example of Figure 4. Statistical real time data related to the players may also be shown 410.

In step 304, the apparatus is configured to control a touch screen to detect a touch input. The touch screen is configured to detect the start of a touch input from the user of the apparatus. The user may have touched the touch screen with a finger, or stylus.

In step 306, the apparatus is configured to activate the microphone on the basis of the touch input. In an embodiment, the apparatus detects a touch on the touch screen and activates the microphone.

In step 308, the apparatus is configured to control a microphone to receive audio input. The microphone is configured to receive audio input from the user of the apparatus. For example, the user may say the name of the

player performing the action.

In step 310, the apparatus is configured to associate the touch input with a given name in the database on the basis of the audio input. In an embodiment, the apparatus stores information on the touch input and  
5 associates the touch input with a name from the database on the basis of the audio input. The apparatus may apply voice recognition algorithms to detect the name with was spoken by the user and find a corresponding name from the database.

In an embodiment, several types of statistical information may be  
10 collected regarding the players. In an embodiment, this information may be collected using timers or counters. For example, for each player of the team following timers or counters may be kept:

- Time of ball possession
- Pass count: successful passes/first touches, also with respect to  
15 the area of the pitch/field (attack or defence). This may include the number of passes to different directions (forward vs backward, for example)
- Number of times in pass strings
- Cuts (Interceptions or tackling)
- Shots
- 20 - Pass timer for passers-from (name of players and number of passes obtained from) and passers-to (name of players and number of passes played to).

Some of the timers or counters may be actions that can be identified with voice recognition when action is uttered after name, for example:

- 25 - "Stiina" ... "tackling" (Stiina's counter for cuts is refined by incrementing tackles)
- "Julle" ... "shot" (Julle's shot counter is incremented).

In step 312, after detecting start of touch input and receiving and associating audio input, the apparatus is configured to start incrementing a  
30 possession time timer. The incremented time may be shown in real time on the touch screen.

If the previous first touch is by the own team, the pass counter of the previously identified player may be incremented (a successful pass). Also, the counter of pass string may be incremented and the name of the player  
35 added pass string. A pass string forms when the ball is successfully passed from one player to another more than one time.

If the previous first touch is by opponent then the player's counter for cuts is incremented (a successful interception or tackling).

In step 314, the apparatus is configured to detect end of touch input. In an embodiment, the user may swipe the finger into direction of pass. Alternatively, the user may just raise finger if there is no clear direction for pass. The apparatus may be configured to detect from the touch input whether a pass was made or not.

In step 316, the apparatus is configured to stop incrementing the possession time timer.

The example ends at step 318.

Sometimes when passes are recorded/identified it is useful that an approximate position of the player in the field may be identified as well. Typically it is a lot more difficult to make a successful pass on the attack zone than in the own defence zone. Figure 5 illustrates an example of an embodiment utilising a simple method to identify between attack and defence areas. In this example, the the user interface is divided into two areas where the upper area 500 indicates attack area and the lower area 502 indicates defence area. When the apparatus detects a touch on area 504 the apparatus may determine that the player gaining the possession of the ball is in the attack area. Respectively, when the apparatus detects a touch on area 404 the apparatus may determine that the player gaining the possession of the ball is in the defence area. The detection process is identical to the Figure 4 except that when player is identified with voice recognition also the information about the position of the player in the field is stored: attack or defence area. The user interface may comprise two areas 406, 506 for the opposing team as well.

Sometimes it is useful to collect information about how players move in the field during the game. Figure 6 illustrates an example of an embodiment where this information can be collected. In this example embodiment, the touch screen shows a representation 600 of the playing field as a background. The detection process is identical to previously described except that apparatus is configured to detect when a finger 602 is pressed at an approximate position 604 of the player in the field. In this case, the user may have to look at the user interface once in a while to calibrate his finger position in the touch user interface to correspond to player's real position in the field. The apparatus is configured to detect the movement 606 of the finger; the movement representing the movement of the player detect the end of the



touch 608. At the end of the touch a swipe may be detected marking a pass into the swiped direction. Also this interface may comprise an area 610 for the opposite team.

5 The interface types of figures 5 and 6 may be user selectable. For example, the user may give the apparatus a command to display selected interface. The interface may be changed by swiping the screen from one border to another, for example.

10 Thus in an embodiment, the apparatus is configured to determine the properties of the touch input. The properties may comprise the location of the touch input and length and direction of the touch input.

15 The apparatus may be configured to associate the touch input with a given action and location on the playing field depending on the detected properties of the touch. For example, if the touch is a press and a swipe the touch may be associated with a pass. For example, when a player is passing the ball to another player the user may touch the screen and swipe to the direction of the pass. The user may also say the name of the player making the pass. The user may also say another name which indicates the player receiving the ball. Both names may be detected and stored.

20 If the touch is a long press moving on the touch screen, the touch may be associated with the player moving with the ball on the playing field. The user may touch the screen and begin moving the finger on the screen. The touch is detected and microphone activated. The user may say the name of the player in the beginning of the movement. The apparatus may be configured to disable the microphone after a given time period. When the movement ends and the finger is lifted from the touch screen, the properties of the movement are detected and association performed.

25 When a long press moving on the touch screen ends with a swipe to a given direction, the touch may be associated with the player moving with the ball on the playing field and giving a pass at the end of the movement.

30 The apparatus may be configured to maintain a database comprising coordinates of a playing field. The apparatus may be configured to detect the location of the touch on the touch screen and associate the action to a given location on the playing field on the basis of the location of the touch input.

35 Thus, different actions or activities performed by the players on the playing field may be indicated with different types of touches. The obtained

information may be stored for later review and analysis.

In an embodiment, examples of actions of activities may comprise:

- number of first contacts (with the ball)
- successful passes
- 5 - unsuccessful passes
- successful breaks
- time when possessing the ball
- locations of the above actions or activities.

In the case of passes the algorithm determining the action may  
10 need to wait for the detection of a following touch and audio input in order to determine whether the pass was successful or unsuccessful. If the following touch and audio input indicate that the ball is in the possession of the own team the pass was successful.

The proposed solution enables tracking the activities of a sporting  
15 event effortlessly and reliably. The use of touch screen is intuitive and as the apparatus is able to receive the performer of the activity as an audio input the user need not necessarily look at the apparatus when tracking events.

In an embodiment, the apparatus may be utilised when viewing the  
20 collected data. The collected data may be displayed in real time or it may be viewed later.

In an embodiment, some information gathered during a game may  
be shown on the touch screen as so called heat maps. For example, for a  
given player, the movements or runs with the ball may be shown on the screen  
with the playing field as a background. In addition, passes and shots of the  
25 player may be shown on the screen in a similar manner. Figure 7 illustrates an example of a heat map. In the map, player's movements or runs with the ball on the playing field 600 are shown as lines 702 and passes and shots with ball figures 704.

The steps and related functions described in the above and  
30 attached figures are in no absolute chronological order, and some of the steps may be performed simultaneously or in an order differing from the given one. Other functions can also be executed between the steps or within the steps. Some of the steps can also be left out or replaced with a corresponding step.

The apparatuses or controllers able to perform the above-described  
35 steps may be implemented as an electronic digital computer, which may comprise a working memory (RAM), a central processing unit (CPU), and a

system clock. The CPU may comprise a set of registers, an arithmetic logic unit, and a controller. The controller is controlled by a sequence of program instructions transferred to the CPU from the RAM. The controller may contain a number of microinstructions for basic operations. The implementation of  
5 microinstructions may vary depending on the CPU design. The program instructions may be coded by a programming language, which may be a high-level programming language, such as C, Java, etc., or a low-level programming language, such as a machine language, or an assembler. The electronic digital computer may also have an operating system, which may  
10 provide system services to a computer program written with the program instructions.

As used in this application, the term 'circuitry' refers to all of the following: (a) hardware-only circuit implementations, such as implementations in only analog and/or digital circuitry, and (b) combinations of circuits and  
15 software (and/or firmware), such as (as applicable): (i) a combination of processor(s) or (ii) portions of processor(s)/software including digital signal processor(s), software, and memory(ies) that work together to cause an apparatus to perform various functions, and (c) circuits, such as a microprocessor(s) or a portion of a microprocessor(s), that require software or  
20 firmware for operation, even if the software or firmware is not physically present.

This definition of 'circuitry' applies to all uses of this term in this application. As a further example, as used in this application, the term 'circuitry' would also cover an implementation of merely a processor (or multiple  
25 processors) or a portion of a processor and its (or their) accompanying software and/or firmware. The term 'circuitry' would also cover, for example and if applicable to the particular element, a baseband integrated circuit or applications processor integrated circuit for a mobile phone or a similar integrated circuit in a server, a cellular network device, or another network  
30 device.

An embodiment provides a computer program embodied on a distribution medium, comprising program instructions which, when loaded into an electronic apparatus, are configured to control the apparatus to execute the  
embodiments described above.

35 The computer program may be in source code form, object code form, or in some intermediate form, and it may be stored in some sort of

carrier, which may be any entity or device capable of carrying the program. Such carriers include a record medium, computer memory, read-only memory, and a software distribution package, for example. Depending on the processing power needed, the computer program may be executed in a single  
5 electronic digital computer or it may be distributed amongst a number of computers.

The apparatus may also be implemented as one or more integrated circuits, such as application-specific integrated circuits ASIC. Other hardware embodiments are also feasible, such as a circuit built of separate logic  
10 components. A hybrid of these different implementations is also feasible. When selecting the method of implementation, a person skilled in the art will consider the requirements set for the size and power consumption of the apparatus, the necessary processing capacity, production costs, and production volumes, for example.

15 It will be obvious to a person skilled in the art that, as the technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

## Claims

1. A method for tracking activities, comprising:  
maintaining a database of names;  
controlling a touch screen to receive a touch input;  
5 controlling a microphone to receive audio input; and  
associating the touch input with a given name in the database on  
the basis of the audio input.
2. A method of claim 1, further comprising:  
10 controlling the touch screen to display a first area and a second  
area, and  
activating the microphone after detecting a touch on the first area of  
the touch screen.
3. A method of claim 1 or 2, further comprising:  
15 associating the touch input with a given action on the basis of the  
properties of the touch input.
4. A method of claim 3, wherein the given action is at least one of  
20 the following:  
a contact with a ball, a pass to given direction to a fellow team  
player; a shot; a missed pass; a corner kick, a free kick; a movement with the  
ball, or a throw.
5. A method of any preceding claim, further comprising:  
25 maintaining a database comprising coordinates of a playing field;  
associating the action to a given location on the playing field on the  
basis of the location of the touch input.
6. An apparatus, comprising:  
30 at least one processor; and  
at least one memory including computer program code,  
the at least one memory and the computer program code configured  
to, with the at least one processor, cause the apparatus at least to perform:  
35 maintain a database of names;

control a touch screen to receive a touch input;  
control a microphone to receive audio input;  
associate the touch input with a given name in the database on the  
basis of the audio input.

5

7. The apparatus of claim 6, the at least one memory and the  
computer program code configured to, with the at least one processor, cause  
the apparatus, further to:

control the touch screen to display a first area and a second area,  
10 and  
activate microphone after detecting a touch on the first area of the  
touch screen.

8. The apparatus of claim 6 or 7, the at least one memory and the  
15 computer program code configured to, with the at least one processor, cause  
the apparatus, further to:

associate the touch input with a given action on the basis of the  
properties of the touch input.

20 9. The apparatus of claim 8, wherein the properties of the touch  
input comprise at least one of the following:

location of the touch input;  
length and direction of the touch input,  
the at least one memory and the computer program code configured  
25 to, with the at least one processor, cause the apparatus, further to:  
maintain a database comprising coordinates of a playing field;  
associate the action to a given location on the playing field on the  
basis of the location of the touch input.

30 10. A computer program product embodied on a distribution medium  
readable by a computer and comprising program instructions which, when  
loaded into an apparatus, execute a computer process performing the steps of  
any preceding claim 1 to 5.

35

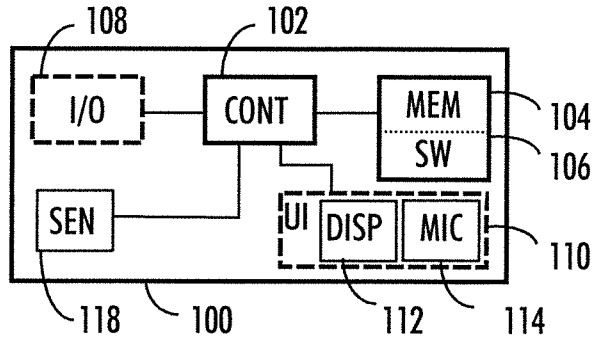


FIG. 1

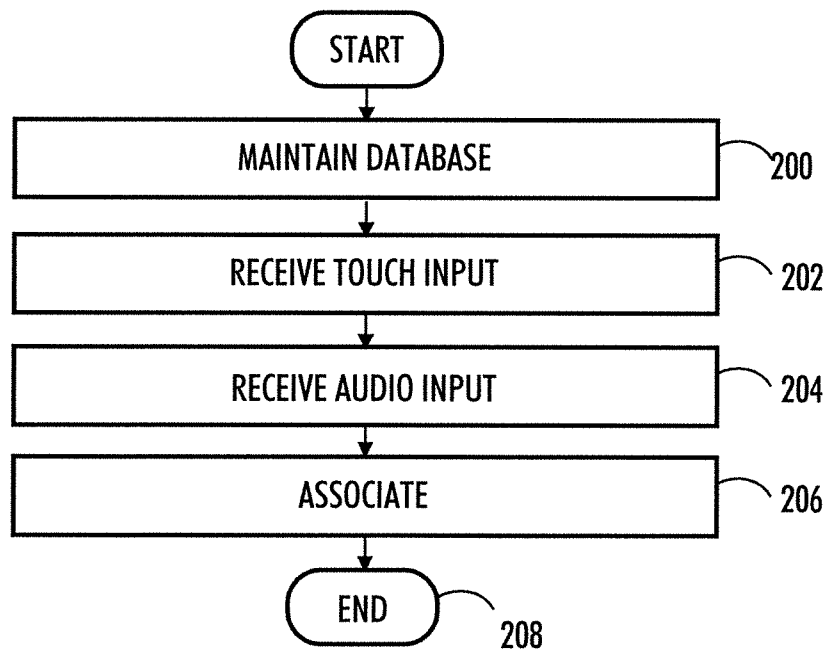


FIG. 2

2/4

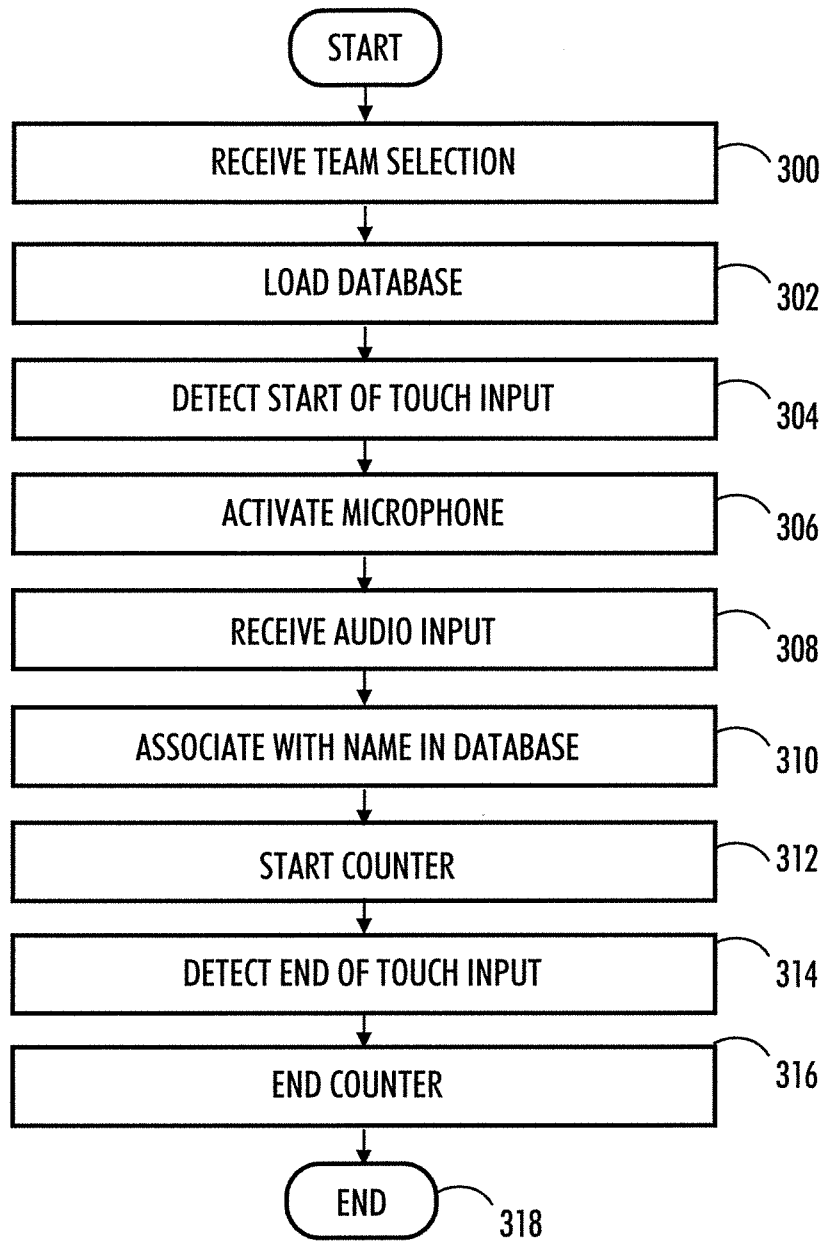


FIG. 3



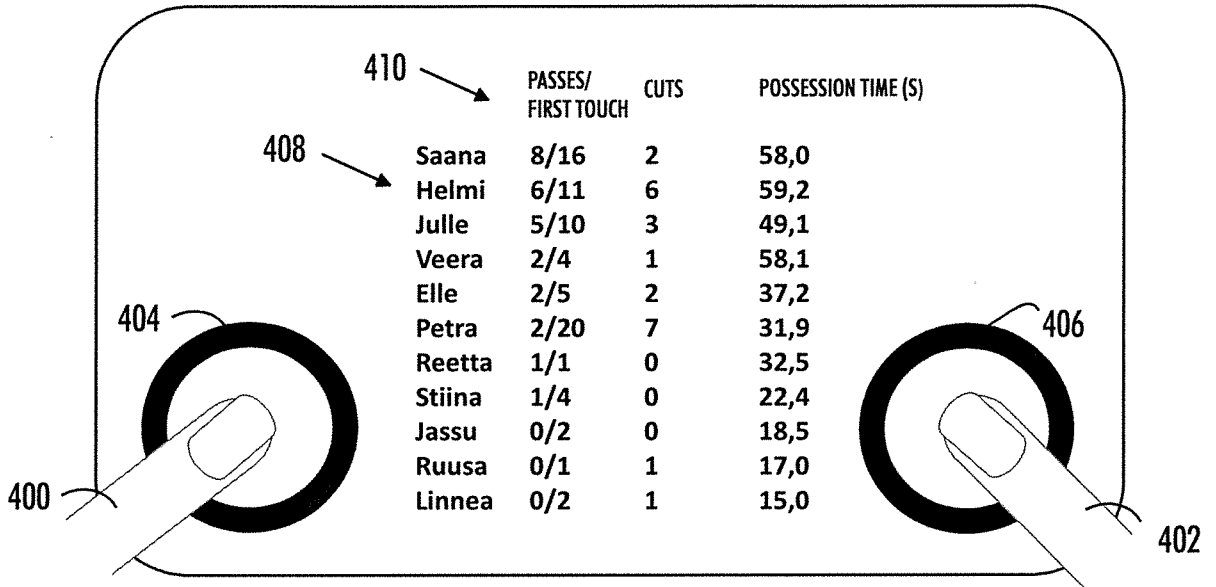


FIG. 4

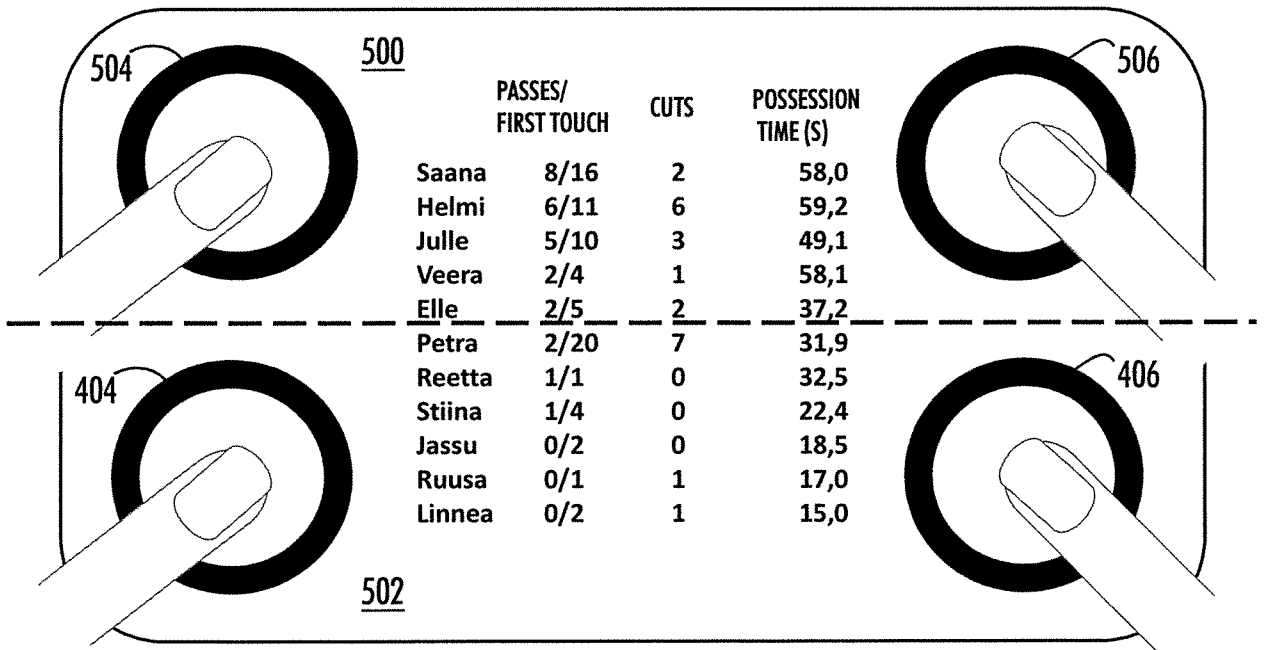


FIG. 5

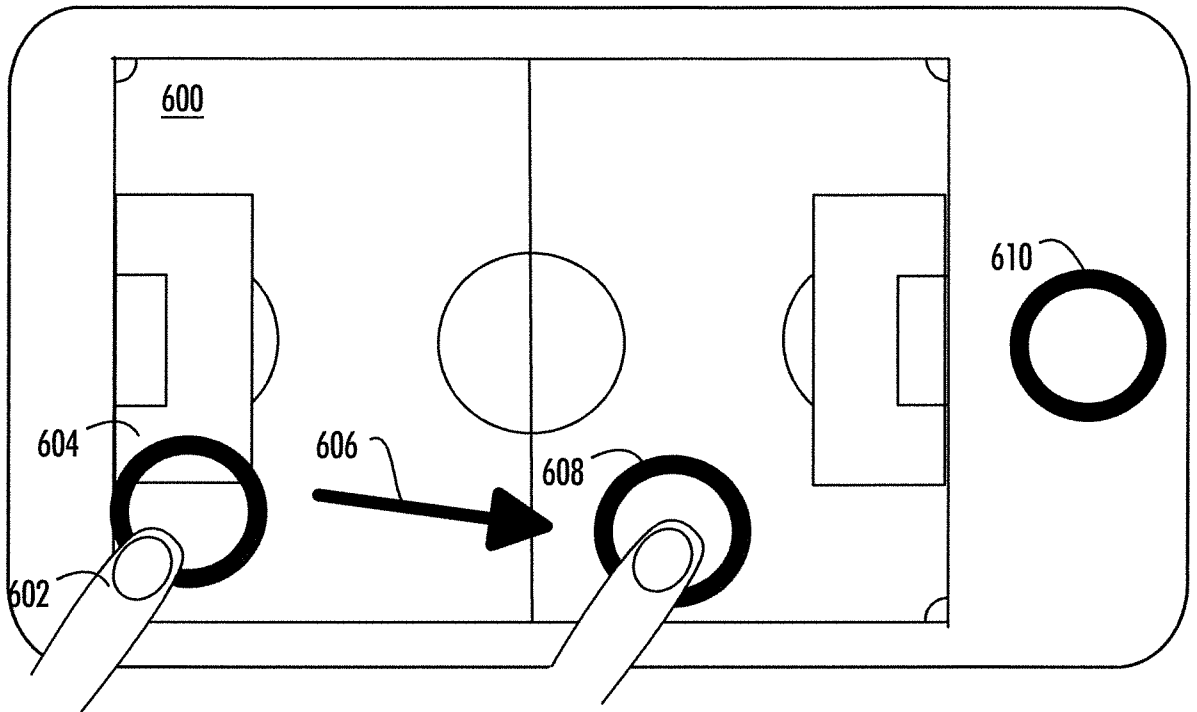


FIG. 6

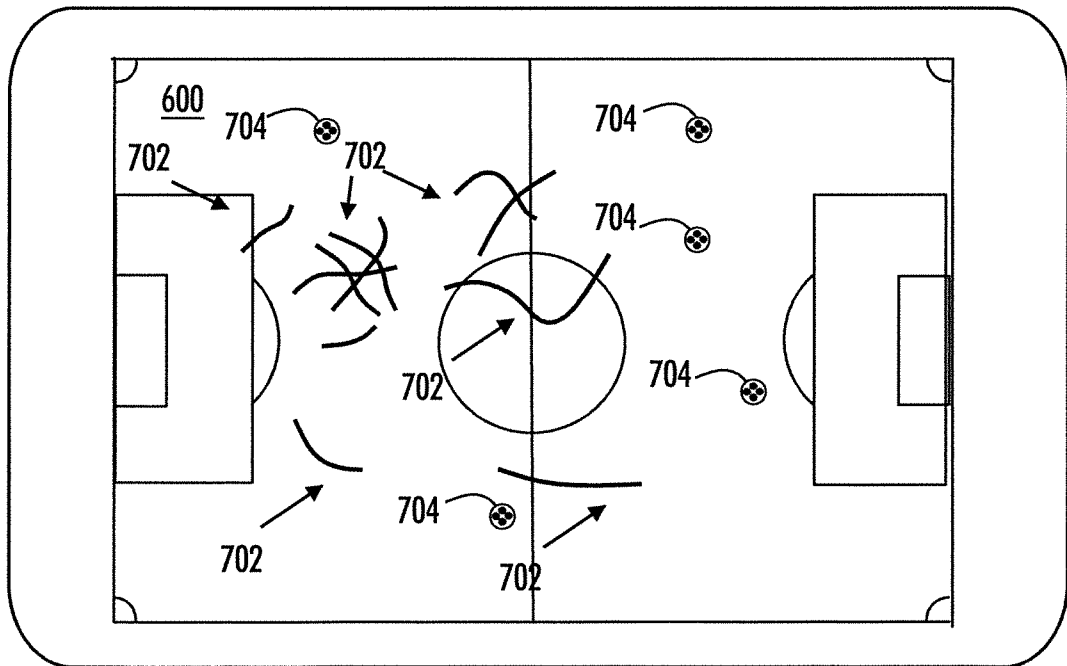


FIG. 7

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2015/050840

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b>  |  |                       |
|---|--|-----------------------|
| See extra sheet   |  |                       |
| According to International Patent Classification (IPC) or to both national classification and IPC   |  |                       |
| <b>B. FIELDS SEARCHED</b>   |  |                       |
| Minimum documentation searched (classification system followed by classification symbols)   |  |                       |
| IPC: G06F, A63F, A63B   |  |                       |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched   |  |                       |
| FI, SE, NO, DK  |  |                       |
| Electronic data base consulted during the international search (name of data base, and, where practicable, search terms used)   |  |                       |
| EPO-Internal  |  |                       |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>   |  |                       |
| Category*   | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
| X   | US 7620466 B2 (NEALE STUART [US] et al.)<br>17 November 2009 (17.11.2009)  | 1-2, 5-7, 10          |
| Y   | col. 2 lines 4-23, col. 5 lines 46-49, col. 6 lines 2-6, col. 6 lines 30-34, figs 7, 9   | 3, 4, 8, 9            |
| Y   | US 2004130525 A1 (SUCHOCKI EDWARD J [US])<br>08 July 2004 (08.07.2004)   | 3, 4, 8, 9            |
| A   | abstract, paras [0005], [0007], [0020]   | 1-2, 5-7, 10          |
| A   | CA 2550360 A1 (CLAUSI DAVID ANTHONY [CA])<br>15 December 2006 (15.12.2006)   | 1-10                  |
| A   | US 6122559 A (BOHN DAVID W [US]) 19 September 2000 (19.09.2000)  | 1-10                  |
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**INTERNATIONAL SEARCH REPORT**  
**Information on Patent Family Members**

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CLASSIFICATION OF SUBJECT MATTER

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